

PATENT ABSTRACTS OF JAPAN

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(71)Applicant : NIPPON TELEGR & TELEPH CORP
<NTT>

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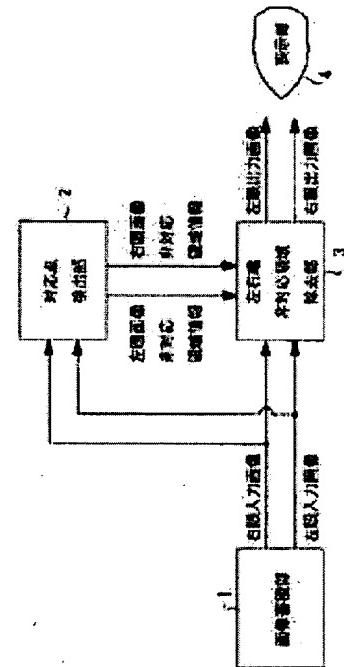
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YOROISAWA ISAMU

(54) BOTH-EYE STEREOSCOPIC VISUAL EQUIPMENT

(57)Abstract:

PURPOSE: To improve the stereoscopic sense while suppressing visual field competition by detecting the correspondence between left and right pictures and devising the device such that an area only in existence in a picture of one eye at left and right ends of a pattern is not displayed.

CONSTITUTION: A left right end non-correspondence area elimination section 3 eliminates a non-correspondence area placed at left and right ends of a left eye input picture and a right eye input picture inputted from a picture storage section 1 based on left eye picture non-correspondence area information and right eye picture non-correspondence area information inputted from a corresponding point detection section 2. As a result, obtained left eye output picture and right eye output picture are outputted on a display section 4. The display section 4 displays the picture such that the left eye output picture inputted from the elimination section 3 is inputted to the left eye of an observer and the right eye output picture inputted from the elimination section 3 is inputted to the right eye of the observer respectively. Since an area which is in existence in a picture of one eye only is avoided at left and right ends of the pattern, visual field competition is suppressed or eliminated.



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CLAIMS

[Claim(s)]

[Claim 1]Binocular-vision equipment characterized by having the function to improve a cubic effect by not displaying a field which exists only in a picture of the one eye in right and left ends of each picture shown to a left eye and a right eye in binocular-vision equipment which presents two kinds of pictures which are different in right-and-left both eyes.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Industrial Application]This invention relates to the binocular-vision equipment which acquires a cubic effect by showing two kinds of pictures like stereoscopic television or the binocular-vision equipment for an experiment which are different in right-and-left both eyes.

[0002]

[Description of the Prior Art]Conventionally, as binocular-vision equipment, as shown in drawing 2, the method of showing the left eye image 101 to a left eye, and showing the right eye image 102 to a right eye as it is taken.

[0003]

[Problem to be solved by the invention]In conventional binocular-vision equipment, as shown in drawing 3, the picture 101,102 having included the non-corresponding areas 103 was displayed at the right and left ends of the screen. For this reason, the field (non-corresponding areas 103) which exists only in the picture of the one eye in the right and left ends of a screen produced, binocular rivalry happened, and a cubic effect was reduced.

[0004]An object of this invention is to raise a cubic effect, as binocular rivalry does not arise.

[0005]

[Means for solving problem]This invention detects correspondence of a right-and-left picture, and it constitutes it so that a field which exists only in a picture of the one eye in right and left ends of a screen may not be displayed.

[0006]

[Function]Since the field which exists only in the picture of the one eye in the right and left ends of a screen is not displayed, this invention acts to control or cancel binocular rivalry.

[0007]

[Working example]The embodiment of this invention is described with reference to a screen below. Drawing 1 is a block diagram showing the embodiment of this invention. An image storage part 1 and 2 express a corresponding-points primary detecting element, 3 expresses a right-and-left-ends non-corresponding-areas removing part, and the mark 1 in a figure expresses the display 4.

[0008]The left eye inputted image and right eye inputted image which were read from the image storage part 1 are outputted to the corresponding-points primary detecting element 2 and the right-and-left-ends non-corresponding-areas removing part 3. As fields other than the field which asked for the field where the left eye image 101 and the right eye image 102 correspond based on correlation with the left eye inputted image and right eye inputted image which were inputted from the image storage part 1 in the corresponding-points primary detecting element 2, and was able to take correspondence. The information on the non-corresponding areas 103 in the left eye image 101 and the non-corresponding areas 103 in the right eye image 102 is outputted to the right-and-left-ends non-corresponding-areas removing part 3.

[0009]The right-and-left-ends non-corresponding-areas removing part 3 the non-corresponding areas located in the right and left ends of the left eye inputted image inputted from the image storage part 1, and a right eye inputted image based on the left eye image non-corresponding-

areas information and the right eye image non-corresponding-areas information that it was inputted from the corresponding-points primary detecting element 2. It removes and the left eye outputted image and right eye outputted image which were obtained as a result are outputted to the display 4. The display 4 is displayed so that the left eye outputted image inputted from the right-and-left-ends non-corresponding-areas removing part 3 may be inputted into an observer's left eye and a right eye outputted image may be inputted into an observer's right eye, respectively.

[0010] Drawing 4 expresses the right-and-left-eyes outputted image by this invention. The mark 104 in a figure expresses a left eye outputted image, and 105 expresses a right eye outputted image. One flow chart showing processing of the corresponding-points primary detecting element which drawing 5 and drawing 6 become together and shows drawing 1 is constituted, and A in drawing 5 is connected with A in drawing 6.

[0011] A pixel value of L(x, y) and a right eye image is set to R(x, y) for a pixel value of a left eye image in a picture element position (x, y). A value of azimuth difference in a picture element position (x, y) is set to d(x, y), and the range of a value which azimuth difference can take is set to $-D \leq d \leq +D$. It is a size of correlation of a right-and-left pixel over the azimuth difference d in a picture element position (x, y) $C(x, y, d) = 1/\{L(x, y) - R(x+d, y)\}$

It carries out and a threshold value for a mutually related existence judging is made into C_{th} .

[0012] and -- the next processing is performed about all picture element position (x, y).

Processing **: Preset a value of the azimuth difference d to $-D$ at first.

Processing **: Investigate whether a value of the azimuth difference d in a certain picture element position (x, y) is below $+D$. If it is NO, it will progress to processing **.

[0013] Processing **: When it is YES, calculate size C of correlation of a right-and-left pixel.

Processing **: Progress to processing ** after several times which ranks second, carries out azimuth difference d plus 1, and returns to processing **.

[0014] Processing **: When set to NO in processing **, set a value of the azimuth difference d to $-D$, set a value of CMAX to zero, and set a value of DMAX to zero.

Processing **: Investigate whether a value of the azimuth difference d is below $+D$. If it is NO, it will progress to processing (10).

[0015] Processing **: When it is YES, investigate whether a value of CMAX is smaller than size C(x, y, d) of correlation previously searched for by drawing 5. If it is NO, it will progress to processing **.

[0016] Processing **: When it is YES, set size C(x, y, d) of the above-mentioned correlation to a value of the above-mentioned CMAX, and set a value of the azimuth difference d to DMAX.

Processing **: Carry out azimuth difference d plus 1, and return to processing **. It progresses after several times to processing (10).

Processing (10): Investigate whether a value of MAX at that time is larger than threshold value C_{th} of a mutually related size. If it is NO, it will progress to processing (12).

Processing (11): When it is YES in processing (10), mean that there is a pixel corresponding by right and left, and define a value of the azimuth difference d of a place which took a value of the DMAX concerned.

processing (12): -- when it is NO in processing (10), it means that there is no pixel corresponding by right and left -- the pixels concerned are disparate points -- it is rich and makes.

[0017]

[Effect of the Invention] According to this invention, since the field which exists only in the picture of the one eye in the right and left ends of a screen is lost, binocular rivalry is controlled or canceled and improvement in a cubic effect can be realized.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The example of composition of this invention is shown.

[Drawing 2] The display example of the right-and-left-eyes picture in conventional technology is shown.

[Drawing 3] The non-corresponding areas in the right-and-left picture in conventional technology are shown.

[Drawing 4] The display example of the right-and-left-eyes picture in this invention is shown.

[Drawing 5] The process flow of the corresponding-points primary detecting element which shows drawing 1 is shown.

[Drawing 6] The process flow of the corresponding-points primary detecting element which shows drawing 1 is shown.

[Explanations of letters or numerals]

1 Image storage part

2 Corresponding-points primary detecting element

3 Right-and-left-ends non-corresponding-areas removing part

4 Display

101 Left eye image

102 Right eye image

103 Right-and-left-ends non-corresponding-areas removing part

104 Left eye outputted image

105 Right eye outputted image

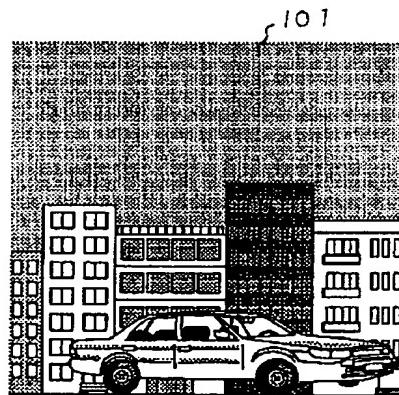
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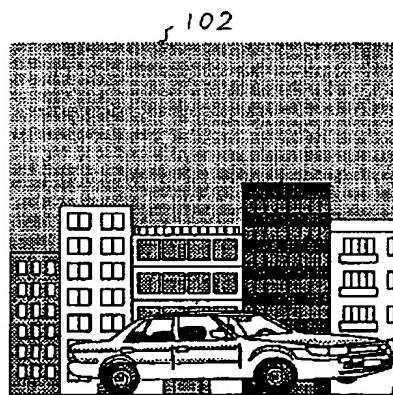
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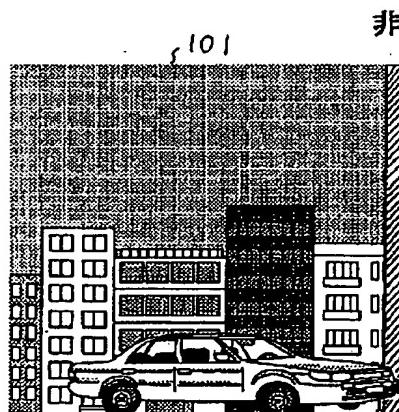
DRAWINGS

[Drawing 2]

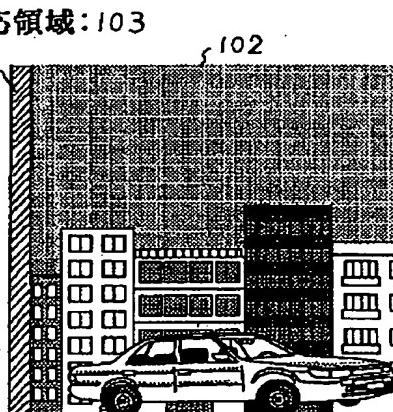
左眼画像



右眼画像

[Drawing 3]

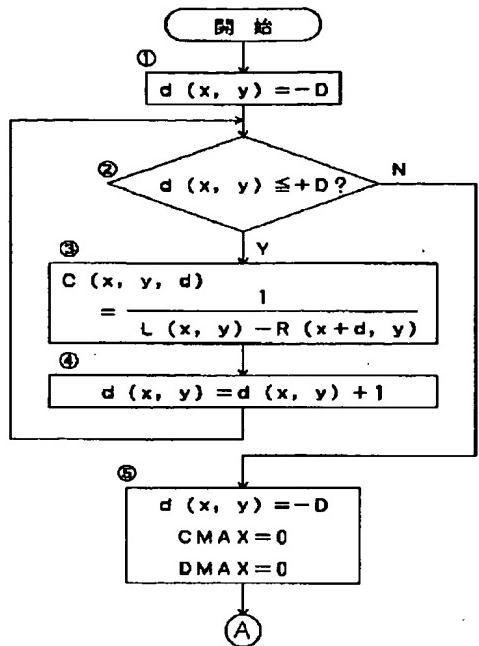
左眼画像



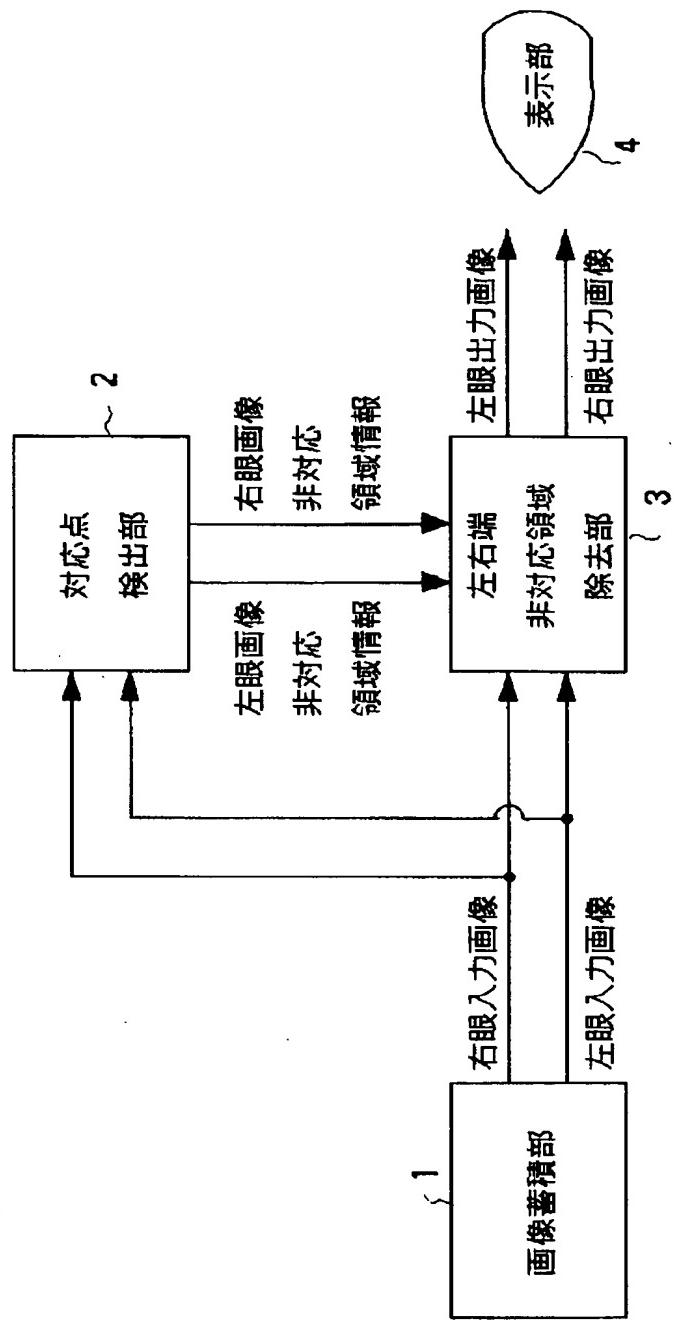
右眼画像

非対応領域: 103

[Drawing 5]



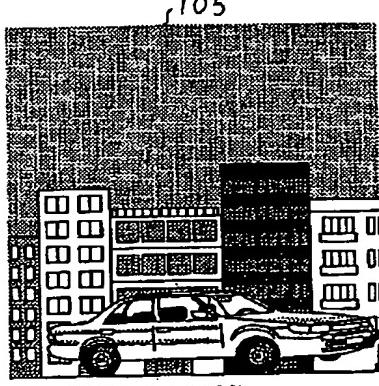
[Drawing 1]



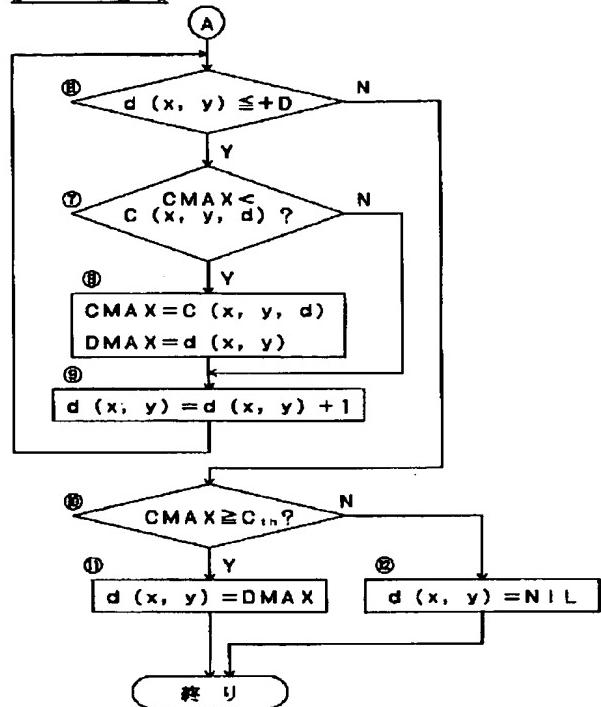
[Drawing 4]



左眼输出画像



右眼输出画像

[Drawing 6]

[Translation done.]

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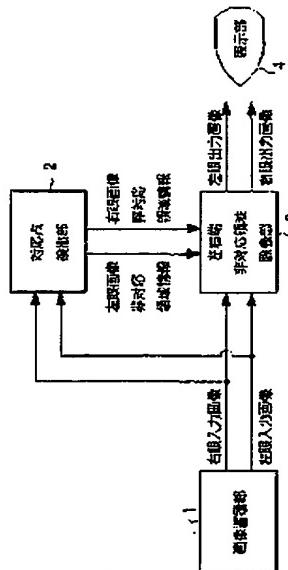
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(54)【発明の名称】両眼立体視装置

(57)【要約】

【目的】本発明は、視野闊歩が生じないようにして立体感を向上させることを目的としている。

【構成】左眼入力画像と右眼入力画像との対応を検出し、画面の左右端において片眼の画像にしか存在しない領域を表示しないよう構成する。



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【特許請求の範囲】
【請求項1】左右両眼に異なる2種類の画像を表示する両眼立体視装置において、

左眼および右眼に表示される各々の画像の左右端で、片眼の画像にしか存在しない領域を表示しないことにより立体感を改善する機能を有することを特徴とする両眼立体視装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、立体テレビや実験用両眼立体視装置の如き、左右両眼に異なる2種類の画像を表示することによって立体感を得る両眼立体視装置に関するものである。

【0002】

【従来の技術】従来、両眼立体視装置としては、図2に示す如く、左眼画像101を左眼に、右眼画像102を右眼にそのまま呈示する方法がとられている。

【0003】

【発明が解決しようとする課題】従来の両眼立体視装置においては、図3に示す如く、画面の左右端に非対応領域103を含んだままの画像101、102を表示していた。このため、画面の左右端において片眼の画像にしか存在しない領域（非対応領域103）が生じ、視野闘争が起こって立体感を低下させていた。

【0004】本発明は、視野闘争が生じないようにして立体感向上させることを目的としている。

【0005】

【課題を解決するための手段】本発明は、左右画像の対応を検出し、画面の左右端において片眼の画像にしか存在しない領域を表示しないよう構成するものである。

【0006】

【作用】本発明には、画面の左右端において片眼の画像にしか存在しない領域が表示されないことから、視野闘争を抑制または解消する作用がある。

【0007】

【実施例】以下に本発明の実施例について、画面を参照。
 $C(x, y, d) = 1 / \{L(x, y, d) - R(x + d, y)\}$

とし、相間の有無判定のための閾値をC_{th}とする。

【0012】そして、すべての画素位置(x, y)について、次の処理を行う。

処理①：最初、視差dの値を-Dにプリセットする。

処理②：或る画素位置(x, y)における視差dの値が+D以下であるか否かを調べる。NOであれば、処理⑤へ進む。

【0013】処理③：YESであった場合、左右画素の相間の大きさCを計算する。

処理④：次いで、視差dをプラス1し、処理②に戻る。幾回かの後に処理⑤へ進む。

【0014】処理⑤：処理②においてNOとなつた際に、視差dの値を-Dとし、CMAXの値を零にセット

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*して説明する。図1は、本発明の実施例を表わすブロック図である。図中の符号1は画像蓄積部、2は対応点検出部、3は左右端非対応領域除去部、4は表示部を表わしている。

【0008】画像蓄積部1から読み出された左眼入力画像および右眼入力画像は対応点検出部2および左右端非対応領域除去部3へ出力される。対応点検出部2では、画像蓄積部1から入力された左眼入力画像と右眼入力画像との相間に基づいて左眼画像101と右眼画像102とが対応する領域を求め、対応がとれた領域以外の領域として左眼画像101における非対応領域103および右眼画像102における非対応領域103の情報を左右端非対応領域除去部3へ出力する。

【0009】左右端非対応領域除去部3は、対応点検出部2から入力された左眼画像非対応領域情報および右眼画像非対応領域情報に基づいて、画像蓄積部1から入力された左眼入力画像および右眼入力画像の左右端に位置する非対応領域を除去し、その結果得られた左眼出力画像および右眼出力画像を表示部4へ出力する。表示部4は、左右端非対応領域除去部3から入力された左眼出力画像が観察者の左眼へ、また右眼出力画像が観察者の右眼へそれぞれ入力されるように表示する。

【0010】図4は本発明による左右眼出力画像を表わす。図中の符号104は左眼出力画像、105は右眼出力画像を表わす。図5と図6とは一緒に図1に示す対応点検出部の処理を表す1つのフローチャートを構成するものであり、図5中のAが図6中のAにつながるものである。

【0011】画素位置(x, y)における左眼画像の画素値をL(x, y)、右眼画像の画素値をR(x, y)とする。また画素位置(x, y)における視差の値をd(x, y)とし、視差の取り得る値の範囲を- $D \leq d \leq +D$ とする。更に画素位置(x, y)における視差dに対する左右画素の相間の大きさを

$$C(x, y, d) = 1 / \{L(x, y, d) - R(x + d, y)\}$$

し、DMA_Xの値を零にセットする。

処理①：視差dの値が+D以下であるか否かを調べる。

NOであれば、処理⑩へ進む。

【0015】処理②：YESであった場合、CMAXの値が先に図5で求めておいた相間の大きさC(x, y, d)よりも小さいか否かを調べる。NOであれば、処理⑩へ進む。

【0016】処理③：YESであった場合、上記CMAXの値に上記相間の大きさC(x, y, d)をセットし、かつDMA_Xに視差dの値をセットする。

処理④：視差dをプラス1し、処理②に戻る。幾回かの後に処理⑩へ進む。

処理⑤：そのときのMAXの値が相間の大きさの閾値

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C_{th} よりも大きいか否かを調べる。NOであれば、処理(12)へ進む。

処理(11)：処理(10)でYESであった場合には左右で対応する画素があることを意味し、当該DMA_Xの値をとった所の視差dの値を定める。

処理(12)：処理(10)でNOであった場合には左右で対応する画素がないことを意味し、当該画素は非対応点であるとみなす。

【0017】

【発明の効果】本発明によれば、画面の左右邊において片眼の画像にしか存在しない領域が無くなるため、視野競争が抑制または解消され、立体感の向上を実現することができる。

【図面の簡単な説明】

【図1】本発明の構成例を示す。

【図2】従来技術における左右眼画像の表示例を示す。*

* 【図3】従来技術における左右画像での非対応領域を示す。

【図4】本発明における左右眼画像の表示例を示す。

【図5】図1に示す対応点検出部の処理フローを示す。

【図6】図1に示す対応点検出部の処理フローを示す。

【符号の説明】

1 画像蓄積部

2 対応点検出部

3 左右端非対応領域除去部

4 表示部

101 左眼画像

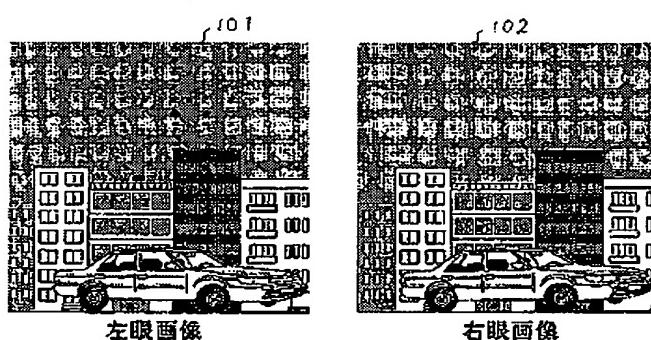
102 右眼画像

103 左右端非対応領域除去部

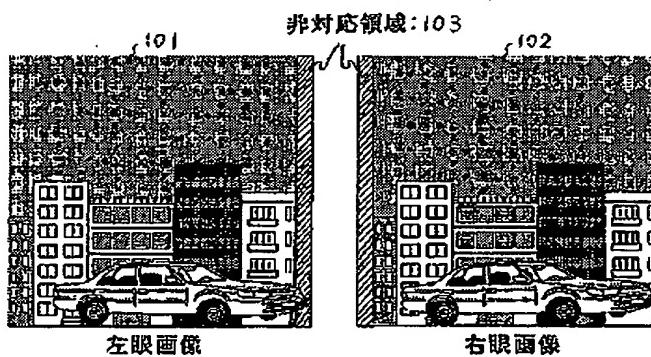
104 左眼出力画像

105 右眼出力画像

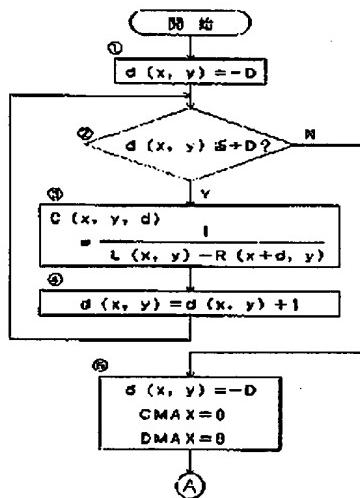
【図2】



【図3】



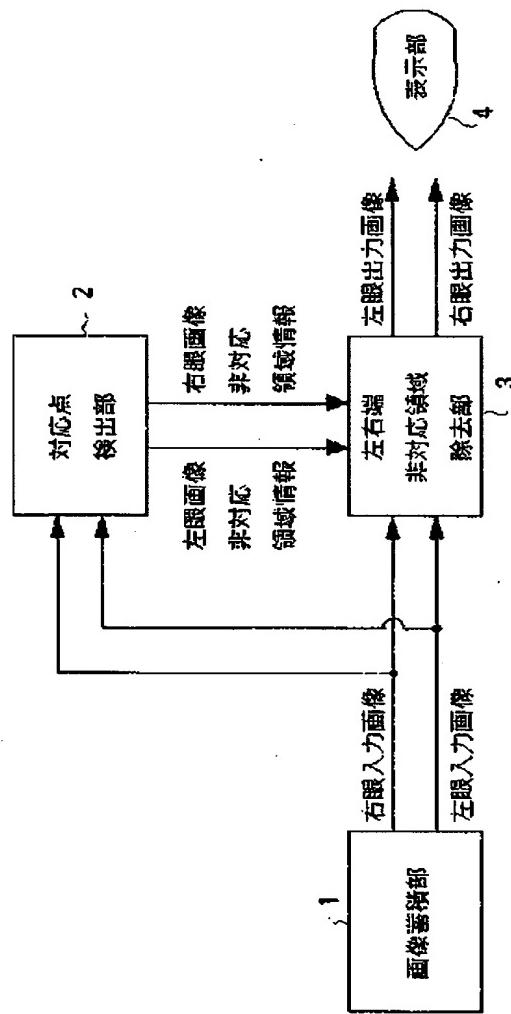
【図5】



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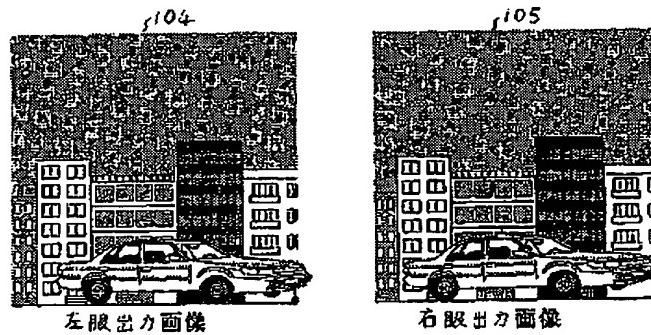
[図1]



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[図4]



[図6]

